Pneumonia Basics

Jeff Weinfeld, M.D.

Assistant Professor

Department of Family Medicine

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Objectives
The learner will …

- **Describe common pathogenesis and pathogens of pneumonia**
- **Discuss diagnosis and management of CAP**
- **Understand features of the Fine prediction rule for pneumonia severity**
- **Discuss the IDSA guidelines and recommendations for initial antibiotic choice**
- **Understand issues in basic management for pneumonia in children, nursing home patients, immunocompromised**

Background

- **Major cause of death worldwide**
  - Est 5 million per year
- **7th in U.S.**
  - Influenza/Pneumonia: 64,000 deaths in 2002 (CDC)
- **High Mortality Rate**
  - 5%outpt, 12% inpt, 40% ICU

Definitions

- **Infection of the lung parenchyma**
- **Usually qualified by agent, cause, site**
- **Community Acquired Pneumonia (CAP)**
  - Not hospitalized
  - long-term care <= 2 wk
- **Nosocomial**

Pathogenesis

- **Microaspiration — S. pneumo**
- **Inhalation — TB, viruses, Legionella**
- **Aspiration – Anerobes**
- **Bloodborne — Staph endocarditis, septic emboli**
- **Direct Extension — Amebiasis, trauma**

Limper AH. Overview of pneumonia. In: Cecil Textbook of Medicine, 22nd Ed., W.B. Saunders Company, 2004: 551-557.

Symptoms

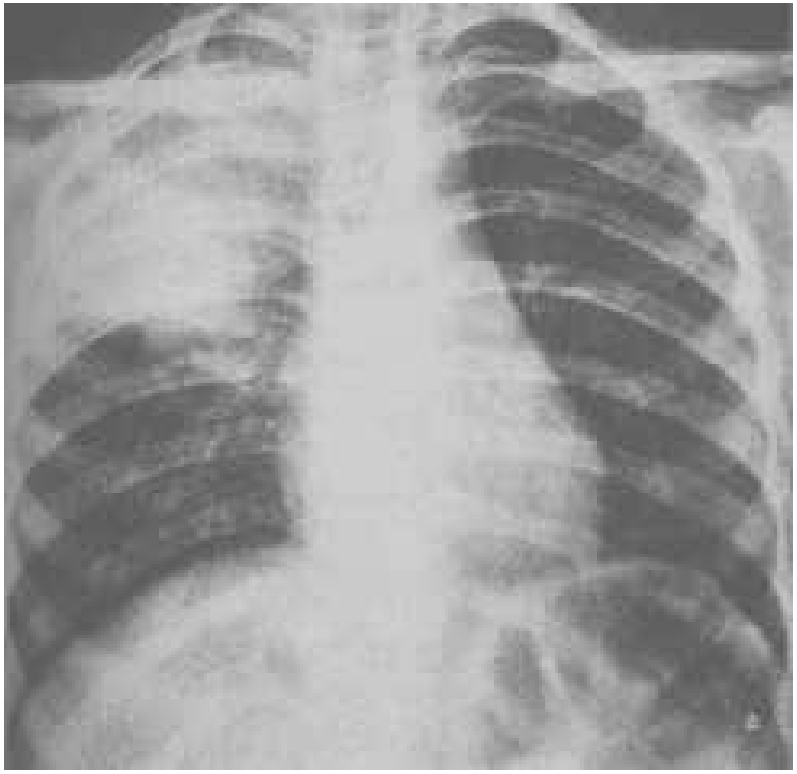
- **New cough (± sputum or change in character)**
- **Fever or hypothermia**
- **(Shaking) Chill**
- **Confusion/Change mental status**
- **Nonspecific (malaise, myalgia, HA)**

Clinical Diagnosis

- **Helpful:**
  - Abnormal VS: RR > 30 or HR> 120 or Temp
  - Abnormal lung findings (crackles, egophony, decreased bs, dullness to percussion)
- **No <u>single</u> history item or finding can rule in or out (most LRs < 4)**
- **Multiple history items or findings cannot predict either!**

Does My Patient Have Pneumonia? JAMA 1997 278 (17):1440.

Radiography
Gold Standard of Diagnosis



Jeff Weinfeld MD —
Pneumonia Basics

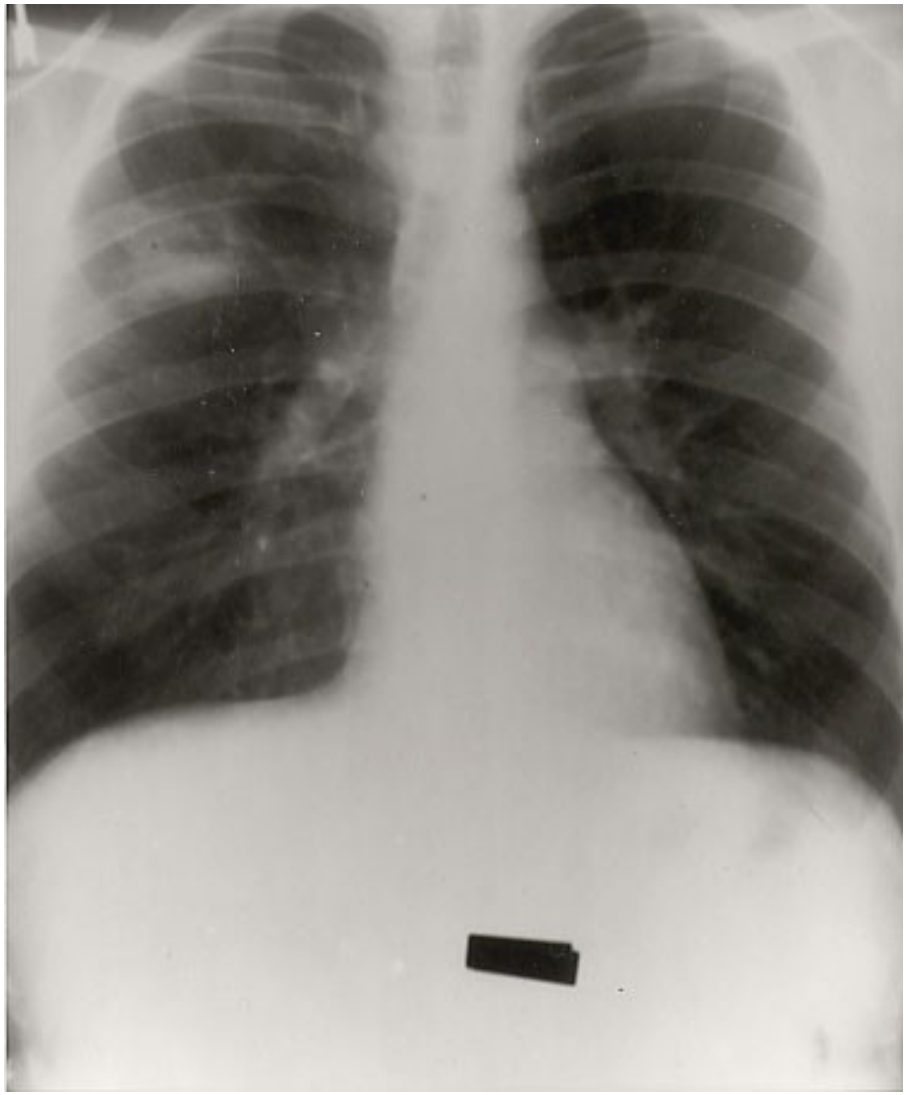
Infiltrate Patterns

Infiltrate Pattern	Possible Dx
Lobar	**S. pneumo, Kleb, H. flu, Gm Neg**
Patchy	**Atypicals, viral, Leigonella**
Interstitial	**Viral, PCP, Leigonella**
Cavitary	**Anerobes, Kleb, TB, Staph aureus, fungi**
Large Effusion	**Staph, Anerobes, Kleb**

A 28-year-old white male comes to your office complaining of fever, malaise, cough, sputum production, and weight loss for 4 weeks. Twelve hours ago his cough increased and he noted frank blood in his sputum, along with a foul taste. Sputum is obtained for routine culture. A chest radiograph is shown in the figure below. Which one of the following diagnostic procedures should be performed prior to the initiation of therapy?

A) Expectorated sputum for mycobacteria
B) Open lung biopsy
C) Immediate bronchoscopy
D) Transtracheal aspiration

Figure for question

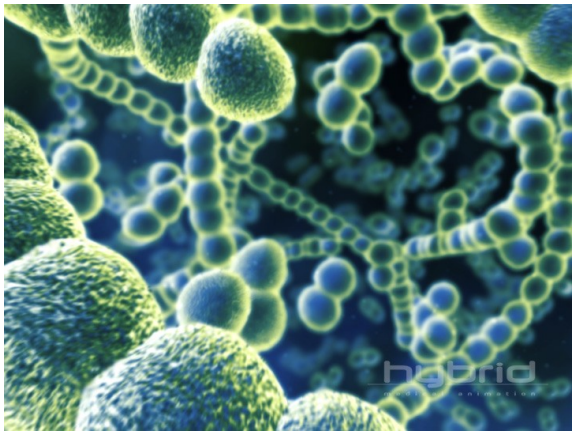


Microbiologic Diagnosis

- **CAP usually single organism**
- **In practice no etiology identified 50%**
- **S. pneumoniae 2/3 of cases w/ID**
- **Atypicals (M. pneumonia, Chlamydia, Leigonella)**
- **Anerobes (aspiration)**
- **Other bacteria (H. influenza, B. catarralis, Staph aureus)**

Streptococcus pneumoniae

- Gm+ lancet rods
- "Typical" symptoms (eg single chill, fever, rusty sputum)
- Lobar X-ray findings
- Suppressed host
- 25% bacteremic



Atypical Pneumonia

- **Perhaps #2 cause (esp young, outpt)**
- **“Atypical” = subacute onset, non-prod cough, no focal lung or X-ray, younger, extra-pulm Sx (Mycoplasma)**
- **Chlamydia — URI Sx, sore throat**
- **Leigonella — Outbreaks, water-borne, hyponatremia, diarrhea**

Viral Pneumonia

- **More common cause in kids (RSV, Influenza, Parainfluenza)**
- **Influenza most important viral cause in adults, esp winter months**
- **Post-Influenza (secondary bacterial infection) = S. pneumo, Staph**

Other Bacteria

- **Anerobes — aspiration, dependent lobe, putrid sputum, dental disease**
- **Gm Negatives**
  - Klebsiella - Alcholics
  - Branhamella catarrhalis — sinus dz, otitis, COPD
  - H. influenzae
- **Staphylococcus aureus — IVDU, older underlying Dz, bilateral/multilobar**

Who to admit?

- **Risk Factors for Poorer Prognosis**
  - **Older Age**
  - **Medical Comorbidities**
  - **Hx (altered MS, nursing home)**
  - **Abn PE (VS abn, Temp, RR)**
  - **Labs (Hypoxemia, ↓Na, Anemia, ↑Glu)**
- **Predicts**
  - **subsequent hospitalization**
  - **ICU admission**
  - **length of hospital stay**

Fine MJ, Auble TE, Yealy DM. A prediction rule to identify low-risk patients with community-acquired pneumonia. NEJM 1997; 336(4): 243-50.

Initial Management CAP: 2003 IDSA Guideline Update

- **Expert panel**
- **Evidence based**
- **Use predictors of morbidity/mortality: Age >= 65, coexisting illness, physical findings, lab findings to help hospitalization decision (ie, Fine decision rule)**
- **Uses treatment setting, age, co-morbidities to suggest likely organisms, preferred therapy**

Mandell LA et al. Update of Practice Guidelines for the Management of Community-Acquired Pneumonia in Immunocompetent Adults (guidelines from the Infectious Diseases Society of America). Clinical Infectious Diseases 2003; 37:1405-1433.

IDSA: Outpatient Management, no co-morbidity

- **Organisms: S. pneumo, mycoplasma, viral, chlamydia, H. flu**
- **Mgmt: no CXR, sputum**
- **Empiric Tx: Macrolide or doxycycline**
- **If recent Abx: respiratory quniolone alone (moxi-, levo-, gemo-, gati-), advanced macrolide (not ery)+amox or amox-clav**
- **Low mortality <5%**

IDSA: Outpatient Management, with co-morbidities

- **Organisms: S. pneumo, viral, H. flu, Gm(-), Staph**
- **Mgmt: +/-CXR, Sputum?**
- **Tx: advanced macrolide or respiratory FQ**
  - If recent Abx: FQ or advanced macrolide + Beta-lactam

IDSA: Inpatient Management CAP, Not Severe

- **Organisms: S. pneumo, H. flu, polymicrobial/anerobic, Gm(-), Leigonella, Staph, Chlamydia, Viral**
- **Mgmt: CXR, Sputum Gm stain/culture (<10 squames, >25 WBC/lpf), Blood Culture x 2, ABG, CBC, BMP, LFTS, HIV**
- **Tx: FQ alone or adv. macrolide + Beta-lactam**
  - Recent Abx: same but keep recent therapy in mind, await sensitivity

IDSA: Inpatient Management CAP Severe/ICU

- **Def: RR>30, resp failure, shock, intubated, pressors, ARF**
- **Organisms: S. pneumo, Leigonella, Gm(-), Mycoplasma, Viral, ? Pseudomonas**
- **Mgmt: As above, consider ICU**
- **Tx: Beta-lactam + macrolide or FQ**
  - ?Pseudomonas - add double coverage
- **High mortality**

Switch to PO

- **For doxy, TMP-SMZ, tetracyclines, quinolones tissue levels po=iv**
- **72 hr iv or 24 hr after temp resolution**
- **Earlier if Sn/Sx improving, afebrile > 8 hrs, decr WBC, NL GI absorption (Clin Pulm Med 1995;2(6)327-33.)**
- **48 hr (Am J Med 2001;111:367-74)**
- **Limited value of observation after switch**

Management of Poor responders

- Consider non-infectious illnesses
- Consider less common pathogens
- Consider serologic testing
- Broaden antibiotic therapy
- Consider bronchoscopy

Prevention

- **Smoking Cessation**
- **Weight loss**
- **Nutritional support**
- **Vaccination**
  - Influenza
  - Pneumococcal

Pneumonia in Children: Dx

- **Dx grunting, flaring, retracting**
- **Wheezing or crackles**
  - (Does this infant have pneumonia? JAMA 1998; 279(4):308-13)
- **RR >60 overall**
  - 6 to 11 months >53/min
  - 1 to 2 years >43/min
  - Arch Ped Adol Med 1995; 149: 283-7

Pneumonia in Children: Common Pathogens

- **0-20 days – E. coli, GBS, Listeria**
- **3 wk – 3 mo – C. trachomatis, S. pneumo, viral**
- **4 mo – 5 yr – C. pneumonia, Mycoplasma, S. pneumo, viral**
- **5 yr – adol - C. pneumonia, Mycoplasma, S. pneumo**

Ostapchuk M et al. Community-Acquired Pneumonia in Infants and Children. AFP 2004;70:899-908.

The treatment of choice for a 4-month-old infant with suspected pertussis is

- A) supportive care only (respiratory, fluids)
- B) ceftriaxone (Rocephin)
- C) ampicillin
- D) gentamicin (Garamycin)
- E) erythromycin

Pneumonia in the Elderly

- **Prevention important**
- **Presentation can be subtle**
- **Antibiotic choice in CAP is same as other adults**
- **Nosocomial: Consider covering Staph and Gm(-)s**
- **Aspiration**

Pneumonia in Older Residents of Long-term care Facilities. AFP 2004;70:1495-500.

Which one of the following drugs would be the most appropriate empiric therapy for nursing home–acquired pneumonia in a patient with no other underlying disease?

- A) Cefazolin (Ancef, Kefzol)
- B) Erythromycin
- C) Ampicillin
- D) Tobramycin (Nebcin)
- E) Levofloxacin (Levaquin)

Pneumonia in Immunocompromised

- **S. pneumo**
- **PCP**
  - Fever, dyspnea, non-prod cough (triad 50%), insidious onset
  - X-ray: Bilat interstitial
  - Steroids for hypoxic patients
  - TMP-SMZ still first line

Wilkin et al. PCP: a clinical review. AFP 1999;60(6).

Newer Agents: Telithromycin (Ketek)

- **Ery derivative**
- **Similar spectrum as clarithro**
- **Can cover some resistant pcn S. pneumo**
- **Several drug interactions (CYP3A4)**
- **CAP: 400 mg 2 daily x 7-10 d**

Med ltr 2004;46:66.

Newer Agents: Quinolones

- **Gemifloxacin (Factive), Gatifloxacin (Tequin), Moxifloxacin (Avelox)**
- **All active against resistant S. pneumo**
- **One daily tx of CAP**
- **PO only (Gati iv/po)**
- **Gemi – more rash**
- **Moxi – Incr QT**

Med Ltr 2004;46:77 and 2000;42:15.

Summary

- **Use clinical clues to guide therapy**
- **Try to make a bacterial diagnosis, especially with inpatients**
- **Use risk factors/guidelines to assist with clinical judgement**

- **Thanks**